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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/714,620	PARIJA ET AL.	
	Examiner	Art Unit	
	MARK A. FLEISCHER	4143	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☒ Claim(s) *4,6 and 8* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Examiner's Note: This non-final Office action was signed on 27 February 2008, but due to a clerical error, it was never mailed. Subsequently, the Office received on 21 March 2008 a preliminary amendment from the Applicant, thereby rendering this action superfluous. In light of the amended claim set, the rejections of this action are hereby withdrawn and the Examiner will supply an updated, non-final Office action to reflect the pending claim set in short order. Applicant need not respond to this communication.

Status of Claims

1. This action is in reply to the Application filed on 18 November 2003.
2. Claims 1–14 are currently pending and have been examined.

Claim Objections

3. Claims 4, 6 and 8 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Claim 3 states that the start time for *each class* is *based on lengths…* whereas claim 4 includes *back-to-back* classes, but such are already encompassed by claim 3. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 4, 6 and 8 recite the limitation "*for each back-to-back class*". There is insufficient antecedent basis for this limitation in the claim.

6. Claim 7 recites the limitation "*the list of valid instructors*". The 'list' however, refers to *a list of classes* wherein the method of inputting (*by…)* is based on *instructors*, but there is no such *list* of instructors articulated. Therefore, there is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1, 2, 7, 9, and 12–14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parija, *et. al* (On Bridging the Gap Between Stochastic Integer Programming and MIP Solver Technologies-2002) in view of Sandhu (Automating Class Schedule Generation in the Context of a University Timetabling Information System-2001).

Claims 1 and 2:

Note, claims 1 and 2 have many of the same limitations, hence the common limitations are addressed together. The additional limitations of claim 2 are further addressed below as indicated. Parija, as shown, describes and/or discloses the following limitations.

- *A stochastic integer programming based constrained optimization method* (Parija, in at least the title and abstract refers generally to "stochastic integer programming". Parija, on page 4, describes the components of the constraints associated with the problem formulation)

Parija, does not specifically refer to the elements of timetabling applications, but Sandhu as shown, does.

- *for allocation of classrooms* (Sandhu, on page 53 near the bottom of the page, refers to "room allocation algorithms") *and instructors* (Sandhu, on page 59 near the top of the page states: "[…] scheduled over 2000 students and instructors […]" (emphasis added) and on page 69 generally refers to "person assigned" which corresponds to the allocation of an *instructor*) *to requested classes* (Sandhu, on page 50 states: "The students were allowed to express preferences for combinations of courses rather than for a single course." (emphasis added) hence, corresponds to *requested classes*) *associated with cancellation probabilities* (Sandhu on page 96 states: "This issue […] takes into consideration all the historical data in regards to timetable classes and generates results considering the percentage of possible clashes." (emphasis added) where the 'historical data' is used to determine 'the percentage of …clashes' hence corresponds to *cancellation* probabilities. Also, on page 84, Sandhu states: "[A] system was derived whereby solutions could be weighted […] so that the probability of a clash could be reduced." (emphasis added) where 'weighted' and 'probability of a clash' also corresponds to *cancellation probabilities.*) *comprising the steps of:*
  - *inputting a list of classes, their cancellation probabilities and available classrooms and instructors* (Sandhu, on page 82 refers to "a list of potential room-time slot allocations available to each entry in the teaching slot table" (emphasis added) and on page 94 describes data pertaining to "classes available", hence corresponds to *a list of classes, classrooms and instructors.* As noted above, Sandhu page 96 refers to equivalents to *cancellation probabilities*);
  - *analyzing operational revenue/profit under different planning scenarios involving chaining of various classes, prerequisite relationships, and inter- class spacing requirements* (Sandhu on page 19 refers to "the objective of meeting a desired goal such as maximizing profits […]" (emphasis added) corresponding to *analyzing operational revenue/profit* and on page 10 states: "[I]n practical terms

the timetabling problem can be described as scheduling a sequence of lectures between teachers and students in a prefixed time period […] satisfying a set of varying constraints [ ]" (emphasis added) where the 'sequence' corresponds to *chaining of various classes* and the 'varying constraints' corresponds to the *prerequisite relationships, and inter- class spacing requirements.*)*; and*

Parija, as shown, describes and/or discloses the following limitations.

- *generating a revenue/profit optimization model of overall operational revenue/profit under the different planning scenarios* (Parija on page 3 refers to "stochastic optimization modeling/solver software…" (emphasis added) hence corresponds to *generating a revenue/profit optimization model*. Note however, that, as stated above, Sandhu on page 19 refers to "maximizing profits". On page 4 Parija states: "The algorithm can be implemented within […] any commercial solver that has the necessary infrastructure for modeling a scenario tree." (emphasis added) hence corresponds to *different planning scenarios.*)

With regard to limitations that are peculiar to **claim 2**, Parija, as shown, describes and/or discloses the following limitations. Note first, that in claim 2, the phrase *by location city* is appended to the last limitation of claim 1. Parija, on page 2 observes that "Such stochastic integer programming (SIP) problems arise, for example, in […] location [type problems…]")

- *solving a stochastic program of a revenue/profit optimization model by solving its deterministic equivalent* (Parija, on page 1 states: "In a typical setting, the uncertainty is resolved by specifying a set of scenarios and the problem is reduced to deterministic, albeit large-scale, mathematical program – known as the deterministic equivalent." (emphasis added) where the correspondence is obvious.)*; and*

Parija does not describe and/or disclose the following limitations, but Sandhu, as shown, does.

- *outputting a list of classes scheduled by curriculum identification (ID), corresponding start date, allocated classrooms, location city, allocated instructor, and expected revenue* (Sandhu, on page 81 notes: "The outputs of the system are the various

management and timetabling reports." (emphasis added) where these reports correspond to *expected revenue*. Sandhu on page 172 further notes "…all combinations of classes to rooms was generated, counted and checked…" and describes outputs of (page 98) "room availabilities", "room teaching usage", "subject class timetable" and "*Staff* as they are allocated rooms" and which correspond to the *classroom, curriculum identification* and *instructor,* respectively. Finally, Sandhu on page 169 states: "[A]ll campuses would be entered to ensure the system could support a multi-campus set up." (emphasis added) hence corresponds to *location city*.)

Parija, *et. al* describes a general modeling approach, *Stochastic Integer Programming*, which is amenable for application to a vast array of problem domains, including that of *timetabling,* the subject of Sandhu's dissertation and the domain of the instant application. Moreover, as the instant Application involves probabilistic elements such as the stochastic demand for classes and class cancellation probabilities, the application of SIP to these types of timetabling problems specifically addresses these uncertainties. Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to combine the teachings of Parija and Sandhu because SIP methodology, with the definition of appropriate constraints, can lead to solutions to difficult timetabling problems.

Claim 7:

Parija/Sandhu describe and/or disclose the limitations of claim 2 as shown above. Parija does not describe and/or disclose the following limitations, but Sandhu, as shown, does.

- *wherein the list of valid instructors for each class is calculated based on the available instructors with required skills during the allowable time windows for each class* (Sandhu on page 10 states: "Thus, in practical terms the timetabling problem can be described as scheduling a sequence of lectures between teachers and students in a prefixed time period […] satisfying a set of varying constraints." (emphasis added) where the 'satisfying constraints' corresponds to *instructors with required skills…*

Also, on page 10 Sandhu refers to "a timetable generation system that generates valid solutions […]" (emphasis added).

Parija, *et. al* describes a general modeling approach, *Stochastic Integer Programming*, which is amenable for application to a vast array of problem domains, including that of *timetabling,* the subject of Sandhu's dissertation and the domain of the instant application. Moreover, as the instant Application involves probabilistic elements such as the stochastic demand for classes and class cancellation probabilities, the application of SIP to these types of timetabling problems specifically addresses these uncertainties. Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to combine the teachings of Parija and Sandhu because SIP methodology, with the definition of appropriate constraints, can lead to solutions to difficult timetabling problems.

Claim 9:

Parija/Sandhu describe and/or disclose the limitations of claim 2 as shown above. Sandhu, as shown, further describes the following limitations.

- *inputting a list of classes by location city, preferred time windows, their cancellation probabilities and available training partner (ATP)* (Sandhu on page 169 states: "[C]omplete data profiling [of] the overall university structure [includes] the following: Campuses – all campuses would be entered to ensure the system could support a multi campus set up" (emphasis added) where 'data profiling' corresponds to *a list of classes by location city* and the 'multi campus set up' corresponds to *location city*. Sandhu, on page 42, refers to "particular time slots […] that were requested by students." (emphasis added) hence corresponds to *preferred time windows*. Sandhu on page 96 states: "This issue […] takes into consideration all the historical data in regards to timetable classes and generates results considering the percentage of possible clashes." (emphasis added) where the 'historical data' is used to determine 'the percentage of …clashes' hence corresponds to *cancellation* probabilities. Also, on page 84 Sandhu states: "[A] system was derived whereby solutions could be

weighted […] so that the probability of a clash could be reduced." (emphasis added) where 'weighted' and 'probability of a clash' also corresponds to *cancellation probabilities*. Finally, on page 69 Sandhu states: "[I]mportant priorities should be examined include[ing] constraining the use of adjunct faculty […]" (emphasis added) where 'adjunct faculty' corresponds to *available training partner.*);

Parija, as shown, describes and/or discloses the following limitations.

- *generating a revenue/profit optimization model of overall operational revenue/profit under the different planning scenarios* (Parija on page 3 refers to "stochastic optimization modeling/solver software…" (emphasis added) hence corresponds to *generating a revenue/profit optimization model*. Note however, that, as stated above, Sandhu on page 19 refers to "maximizing profits". On page 4 Parija states: "The algorithm can be implemented within […] any commercial solver that has the necessary infrastructure for modeling a scenario tree." (emphasis added) hence corresponds to *different planning scenarios*.)

Parija, does not specifically refer to the *locations*, but Sandhu as shown, does.

for all locations and training partner locations simultaneously (Sandhu on page 169 states: "[A]ll campuses would be entered to ensure the system could support a multi-campus set up." (emphasis added) hence corresponds to *locations* and "all faculty details would be entered as they could be cross campus..." (emphasis added) where the emphasized text corresponds to *training partner locations* since 'all faculty' encompasses 'adjunct faculty' which corresponds to *training partner[s].*); *and*

- *outputting a list of available training partner classes scheduled by curriculum ID, corresponding start date, and expected revenue* (Sandhu, on page 81 notes: "The outputs of the system are the various management and timetabling reports." (emphasis added) where these reports correspond to *expected revenue*. Sandhu on page 172 further notes "…all combinations of classes to rooms was generated, counted and checked…" and describes outputs of (page 98) "room availabilities",

"room teaching usage", "subject class timetable" and "*Staff* as they are allocated rooms" and which correspond to the *classroom, curriculum identification* and *instructor,* respectively.)

Parija, *et. al* describes a general modeling approach, *Stochastic Integer Programming*, which is amenable for application to a vast array of problem domains, including that of *timetabling,* the subject of Sandhu's dissertation and the domain of the instant application. Moreover, as the instant Application involves probabilistic elements such as the stochastic demand for classes and class cancellation probabilities, the application of SIP to these types of timetabling problems specifically addresses these uncertainties. Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to combine the teachings of Parija and Sandhu because SIP methodology, with the definition of appropriate constraints, can lead to solutions to difficult timetabling problems.

Claim 12:

Parija/Sandhu describe and/or disclose the limitations of claim 2 as shown above. Parija, does not specifically describe and/or disclose the following limitation, but Sandhu as shown, does.

- *the cancellation probability for each class is calculated from historical data* (Sandhu on page 96 states: "This issue […] takes into consideration all the historical data in regards to timetable classes and generates results considering the percentage of possible clashes." (emphasis added) where the 'historical data' is used to determine 'the percentage of …clashes' hence corresponds to *cancellation* probabilities. Also, on page 84, Sandhu states: "[A] system was derived whereby solutions could be weighted […] so that the probability of a clash could be reduced." (emphasis added) where 'weighted' and 'probability of a clash' also corresponds to *cancellation probabilities.*).

Parija, *et. al* describes a general modeling approach, *Stochastic Integer Programming*, which is amenable for application to a vast array of problem domains, including that of *timetabling,* the subject of Sandhu's dissertation and the domain of the instant application. Moreover, as the

instant Application involves probabilistic elements such as the stochastic demand for classes and class cancellation probabilities, the application of SIP to these types of timetabling problems specifically addresses these uncertainties. Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to combine the teachings of Parija and Sandhu because SIP methodology, with the definition of appropriate constraints, can lead to high quality solutions to difficult timetabling problems.

Claim 13:

Parija/Sandhu describe and/or disclose the limitations of claim 2 as shown above. Parija, does not specifically describe and/or disclose the following limitation, but Sandhu as shown, does.

- *the step of inputting a list of classes with pre-allocated start dates, classrooms and instructors* (Sandhu on page 10 refers to the notion of a "prefixed time period" and thus corresponds to *pre-allocated start dates*. He further mentions on page 64 that "It was concluded that in open shop and class-teacher timetable problems pre-assignment requirements are often present." (emphasis added) hence corresponds to the assignment of instructors to classrooms as per the limitation.)

Examiner takes **Official Notice** that it is old and well-known as well as commonplace in the math programming arts to employ the use of 'hard constraints' where some *a priori* requirements must be satisfied, such as the limitation suggests. Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to combine the teachings of Parija and Sandhu because SIP methodology, with the definition of appropriate constraints, can lead to high quality solutions to difficult timetabling problems.

Claim 14:

Parija, as shown, describes and/or discloses the following limitations.

- *A system implementing stochastic integer programming based constrained optimization* (Parija, in at least the title and abstract refers generally to "stochastic integer programming". Parija, on page 4, describes the components of the constraints associated with the problem formulation)

Parija, does not specifically refer to the elements of timetabling applications, but Sandhu as shown, does.

- *for allocation of classrooms* (Sandhu, on page 53 near the bottom of the page, refers to "room allocation algorithms") *and instructors* (Sandhu, on page 59 near the top of the page states: "[…] scheduled over 2000 students and instructors […]" (emphasis added) and on page 69 generally refers to "person assigned" which corresponds to the allocation of an *instructor*) *to requested classes* (Sandhu, on page 50 states: "The students were allowed to express preferences for combinations of courses rather than for a single course." (emphasis added) hence, corresponds to *requested classes*) *associated with cancellation probabilities* (Sandhu on page 96 states: "This issue […] takes into consideration all the historical data in regards to timetable classes and generates results considering the percentage of possible clashes." (emphasis added) where the 'historical data' is used to determine 'the percentage of …clashes' hence corresponds to *cancellation* probabilities. Also, on page 84, Sandhu states: "[A] system was derived whereby solutions could be weighted […] so that the probability of a clash could be reduced." (emphasis added) where 'weighted' and 'probability of a clash' also corresponds to *cancellation probabilities*) *comprising:*
  - *a database of classes, instructors, classrooms and class requests* (Sandhu refers numerous times to various 'database schema'. On page 51, Sandhu refers to Johnson's paper, cited in this office action, and "[d]iscussed by Johnson (1993) as the use of a database management system for the 'bookkeeping' aspects of timetable development.")*;*
  - *a data processor accessing the database to input a list of classes, their cancellation probabilities and available classrooms and instructors* (Sandhu, on page 13 refers to "multiprocessor systems". Sandhu on page 96 states: "This issue […] takes into consideration all the historical data in regards to timetable classes and generates results considering the percentage of possible clashes."

(emphasis added) where the 'historical data' is used to determine 'the percentage of …clashes' hence corresponds to *cancellation* probabilities. Also, on page 84, Sandhu states: "[A] system was derived whereby solutions could be weighted […] so that the probability of a clash could be reduced." (emphasis added) where 'weighted' and 'probability of a clash' also corresponds to *cancellation probabilities*. Sandhu, on page 82 refers to "a list of potential room-time slot allocations available to each entry in the teaching slot table" (emphasis added) and on page 94 describes data pertaining to "classes available", hence corresponds to *a list of classes, classrooms and instructors.*)*; and*

- *a stochastic integer programming module analyzing operational revenue/profit under different planning scenarios involving chaining of various classes, prerequisite relationships, and inter-class spacing requirements* (Sandhu on page 19 refers to "the objective of meeting a desired goal such as maximizing profits […]" (emphasis added) corresponding to *analyzing operational revenue/profit* and on page 10 states: "[I]n practical terms the timetabling problem can be described as scheduling a sequence of lectures between teachers and students in a prefixed time period […] satisfying a set of varying constraints [ ]" (emphasis added) where the 'sequence' corresponds to *chaining of various classes* and the 'varying constraints' corresponds to the *prerequisite relationships, and inter-class spacing requirements.*)

Parija, as shown, describes and/or discloses the following limitations.

- *and generating a revenue/profit optimization model of overall operational revenue/profit under the different planning scenarios* (Parija on page 3 refers to "stochastic optimization modeling/solver software…" (emphasis added) hence corresponds to *generating a revenue/profit optimization model*. Note however, that, while Parija does not specifically mention *revenue* or *profit* as stated above, Sandhu on page 19 refers to "maximizing profits". On page 4 Parija also states:

"The algorithm can be implemented within […] any commercial solver that has the necessary infrastructure for modeling a scenario tree." (emphasis added) hence corresponds to *different planning scenarios.*).

Parija, *et. al* describes a general modeling approach, *Stochastic Integer Programming*, which is amenable for application to a vast array of problem domains, including that of *timetabling,* the subject of Sandhu's dissertation and the domain of the instant application. Moreover, as the instant Application involves probabilistic elements such as the stochastic demand for classes and class cancellation probabilities, the application of SIP to these types of timetabling problems is thus an obvious choice. Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to combine the teachings of Parija and Sandhu because SIP methodology, with the definition of appropriate constraints, can lead to solutions to difficult timetabling problems.

9. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Parija/Sandhu and further in view of Examiner's **Official Notice** as shown below.

Claim 11:

Parija/Sandhu describe and/or disclose the limitations of claim 2 as shown above. Parija, as shown, further describes the following limitations.

- *generating a revenue/profit optimization model of overall operational revenue/profit under the different planning scenarios for all locations simultaneously* (Parija on page 3 refers to "stochastic optimization modeling/solver software…" (emphasis added) hence corresponds to *generating a revenue/profit optimization model*. On page 4 Parija states: "The algorithm can be implemented within […] any commercial solver that has the necessary infrastructure for modeling a scenario tree." (emphasis added) hence corresponds to *different planning scenarios.*);

Parija does not specifically refer to a *revenue/profit optimization model,* or *all locations simultaneously* but Sandhu in conjunction with Examiner's **Official Notice**, as shown, does. Sandhu on page 19 refers to "maximizing profits". Sandhu on page 169 states: "[A]ll campuses

would be entered to ensure the system could support a multi-campus set up." (emphasis added) hence corresponds to *locations*. Examiner takes **Official Notice** that it is old and well-known as well as commonplace in the math programming arts and constraint satisfaction problems that such constraints are, in effect, handled *simultaneously* in the sense that all constraints must be satisfied in the same instance (hence simultaneously) when considered in a single optimization model. As to the last limitation of this claim, Parija shows the following elements:

- *outputting a distribution of optimal class schedules and associated revenue by scenario* (Parija, on page 5 notes that for SIP problems, "OSLSE provides a rich suite of methods for accessing and manipulating data organized by nodes of the scenario tree." (emphasis added) where the 'data' are available for 'accessing', hence are *output[]*. The term 'organized' corresponds to *outputting a distribution* and the 'data' corresponds to *optimal schedules and associated revenue*. Although Parija does not specifically refer to *revenue,* Sandhu on page 19 refers to "maximizing profits".)

Parija, *et. al* describes a general modeling approach, *Stochastic Integer Programming*, which is amenable for application to a vast array of problem domains, including that of *timetabling,* the subject of Sandhu's dissertation and the domain of the instant application. Moreover, as the instant Application involves probabilistic elements, the application of SIP to these types of timetabling problems specifically addresses these uncertainties. Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to combine the teachings of Parija and Sandhu because SIP methodology, with the definition of appropriate constraints, can lead to solutions to difficult timetabling problems.

10. Claims 3–6, 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parija/Sandhu as applied to claims 1 and 2 above, and further in view of Johnson (A Database Approach to Course Timetabling-1993)

Claim 3:

Parija/Sandhu describe and/or disclose the limitations of claim 2 above. Parija/Sandhu do not specifically describe and/or disclose the following limitation, but Johnson, as shown does.

- *the list of valid start dates for each class is calculated based on lengths of each class and available time windows for each class* (Johnson, on page 427 states: "Not all classes last the same amount of time. [...] In many situations, all classes are some multiple of the basic period, but in some cases, classes of a totally different time might have to be incorporated." (emphasis added) where 'incorporating' different time lengths corresponds to affecting the timetable, hence the *valid start dates*. Johnson further states that "Realistically, we can usually assume that there are enough teaching rooms available in total to accommodate all groups of students, but there will inevitably be problems caused by the use of specialist rooms such as laboratories or workshops." (emphasis added) where an 'available room' *ipso facto* corresponds to an *available time window*. Finally, on page 428 Johnson notes: "In addition to the actual timetables, a variety of lists and forms can be prepared for such things as: room allocations; subject teaching requirements; staff workloads; facility utilization; provided that the relevant data is captured and stored in an appropriate form." (emphasis added) where the 'timetables' specifically denotes the *valid start dates* and 'lists' corresponds to *the list.*)

The details articulated in Johnson merely illustrate some of a wide variety of possible and typical constraints and data that are relevant to timetabling problems and solutions. Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to combine the teachings of Parija/Sandhu with those of Johnson and incorporate established elements into a viable system and method for solving practical timetabling problems associated with colleges and universities.

Claims 4, 6 and 8:

Note that these claims have almost identical limitations and so are addressed together. Parija/Sandhu describe and/or disclose the limitations of claims 3, 5, and 7 above, respectively. With respect to **claim 4**, Parija/Sandhu do not specifically describe and/or disclose the following limitation, but Johnson, as shown does.

- *the lists of valid start dates for each back-to-back class is calculated based on lengths of each class and available time windows for each class* (Johnson, on page 427 states: "Not all classes last the same amount of time. […] In many situations, all classes are some multiple of the basic period, but in some cases, classes of a totally different time might have to be incorporated." (emphasis added) where 'incorporating' different time lengths corresponds to affecting the timetable, hence the *valid start dates*. Johnson further states that "Realistically, we can usually assume that there are enough teaching rooms available in total to accommodate all groups of students, but there will inevitably be problems caused by the use of specialist rooms such as laboratories or workshops." (emphasis added) where an 'available room' *ipso facto* corresponds to an *available time window*. Finally, on page 428 Johnson notes: "In addition to the actual timetables, a variety of lists and forms can be prepared for such things as: room allocations; subject teaching requirements; staff workloads; facility utilization; provided that the relevant data is captured and stored in an appropriate form." (emphasis added) where the 'timetables' specifically denotes the *valid start dates* and 'lists' corresponds to *the list*. Sandhu however shows on page 10 states: "[I]n practical terms the timetabling problem can be described as scheduling a sequence of lectures between teachers and students in a prefixed time period […] satisfying a set of varying constraints [ ]" (emphasis added) where the 'sequence' corresponds to *back-to-back class* and 'varying constraints' corresponds to *lengths of each class*).

Claim 6 has the same limitations as claim 4, except that *valid start dates* are substituted with *lists of classrooms…* Thus, the same analysis obtains: Johnson, on page 427 states: "Not all classes last the same amount of time. […] In many situations, all classes are some multiple of the basic period, but in some cases, classes of a totally different time might have to be incorporated." (emphasis added) where 'incorporating' different time lengths corresponds to affecting the timetable, hence the *valid start dates*. Johnson further states that "Realistically, we can usually

assume that there are enough teaching rooms available in total to accommodate all groups of students, but there will inevitably be problems caused by the use of specialist rooms such as laboratories or workshops." (emphasis added) where an 'available room' *ipso facto* corresponds to an *available time window*. Finally, on page 428 Johnson notes: "In addition to the actual timetables, a variety of lists and forms can be prepared for such things as: room allocations; subject teaching requirements; staff workloads; facility utilization; provided that the relevant data is captured and stored in an appropriate form." (emphasis added) where the 'timetables' specifically denotes the *valid start dates* and 'lists' corresponds to *the list*.

Claim 8 has the same limitations as claims 4 and 6, except that *valid start dates* or *lists of classrooms,* respectively, are substituted with *lists of instructors…* Thus, the same analysis obtains and is briefly summarized: on page 428 Johnson notes: "In addition to the actual timetables, a variety of lists and forms can be prepared for such things as: room allocations; subject teaching requirements; staff workloads; facility utilization; provided that the relevant data is captured and stored in an appropriate form." (emphasis added) where the 'timetables' specifically denotes the *valid start dates* and 'lists' corresponds to *the list of instructors*.

The details articulated in Johnson merely illustrate some of a wide variety of possible constraints and data that are relevant to timetabling problems and solutions such as the inclusion of possible *back-to-back classes*. Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to combine the teachings of Parija/Sandhu with those of Johnson and incorporate established elements into a viable system and method for solving practical, real-world timetabling problems associated with colleges and universities.

Claim 5:

Parija/Sandhu describe and/or disclose the limitations of claim 2 above. Parija/Sandhu do not specifically describe and/or disclose the following limitation, but Johnson, as shown does.

- *the list of valid classrooms for each class is calculated based on tier codes for each class (course) and the available classrooms during the allowable time windows for each class* (Johnson, on page 427 refers to "a much more varied range of subject

choices at both the BCSE and 'A' level." (emphasis added) and on page 432 further distinguishes "undergraduate level" which equate to *tier codes*. In addition, on page 429, Johnson states: "it is often necessary to use codes or initials to refer to individuals, courses or locations." (emphasis added) and goes on to describe "distinct groups of students" attending a "common course" and thus these groups denoted by codes ultimately affect the timetable.)

The details articulated in Johnson merely illustrate some of a wide variety of possible constraints and data that are relevant to timetabling problems and solutions along with the realities associated with database management and implementation. Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to combine the teachings of Parija/Sandhu with those of Johnson and incorporate established elements into a viable system and method for solving practical timetabling problems associated with colleges and universities.

Claim 10:

Parija/Sandhu describe and/or disclose the limitations of claim 9 as shown above. Parija/Sandhu do not specifically describe and/or disclose the following limitation, but Johnson, as shown does.

- *the lists of valid start dates for each class is calculated based on lengths of each class and available time windows for each training partner (ATP) class* (See the rejection of claim 3 regarding *start dates* and *lengths of each class*. As to the elements *available time windows for each training partner (ATP) class,* Sandhu notes on page 15 that "[t]he availability of sessional lecturers and tutors, who generally have to juggle between two or more jobs, can provide an extra complexity to the timetable problem even after it has been generated." (emphasis added) where the emphasized text corresponds to *each training partner class* since the term 'sessional' clearly pertains to a 'class'.)

The details articulated in Johnson as illustrated in the reference to claim 3 merely illustrate some of a wide variety of possible constraints and data that are relevant to timetabling problems and

solutions such as the inclusion of possible *back-to-back classes* and the availability of part-time or adjunct faculty, *i.e., training partners*. Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to combine the teachings of Parija/Sandhu with those of Johnson and incorporate established elements into a viable system and method for solving practical, real-world, timetabling problems associated with colleges and universities.

Conclusion

Any inquiry of a general nature or relating to the status of this application or concerning this communication or earlier communications from the Examiner should be directed to Dr. **Mark A. Fleischer** whose telephone number is **571.270.3925.** The Examiner can normally be reached on Monday-Friday, 9:30am-5:00pm. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, **James A. Reagan** whose telephone number is **571.272.6710** may be contacted.

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27 February 2008
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